

CONTROLLING AIR TOXICS WITH ELECTROSTATIC PRECIPITATORS—THE ABB PROJECT

PRIMARY PROJECT PARTNER

**ABB Combustion
Engineering (CE), Inc.**
Windsor, CT

**ABB Power Plant
Laboratories**
Windsor, CT

ABB Environmental Systems
Knoxville, TN

MAIN SITE

**ABB Power Plant
Laboratories**
Windsor, CT

TOTAL ESTIMATED COST

\$2,794,795

COST SHARING

DOE \$1,985,049

Non-DOE \$809,746

Project Partner

ADA TECHNOLOGIES
Englewood, CO
(technical expertise)

Project Description

Utilities in the United States have been forced to reduce environmental impacts by legislation such as the Clean Air Act Amendments of 1990, and further restrictions are expected within the next 10 years. Pending increased regulations for air toxics control, ABB is evaluating technologies to improve control of the emissions of fine particulates (particles smaller than 10 microns), and thus to reduce the emissions of associated hazardous air pollutants.

Fine particulates are collected from flue gas in coal-based electric utilities with the use of electrostatic precipitators (ESPs), which remove particles in the gas stream by electrostatic charging and subsequent precipitation. Nearly 90% of U.S. coal-based electric utilities use ESPs to collect fine particulates.

The ABB project is developing and evaluating four technologies to enhance the collection of fine particulates by ESPs:

- ABB Proprietary Designed Precharger—charges particulates before they enter the ESP, enhancing the collection of particulates.
- ABB Wet ESP—collects finer particulates than do existing technologies; also collects aerosols.
- Gas Cooling Upstream of the ESP—increases the residence time in the collection area and decreases resistivity, which enhances fine-particulate collection.
- Switched Integrated Rectifier, a new Transformer/Rectifier Set—allows flexible setting of voltage and current characteristics to enhance fine-particulate collection.

A versatile, pilot-scale test facility located at ABB Power Plant Laboratories will be used to investigate and demonstrate these technologies. The facility enables testing under different flue gas conditions typical of coal-based electric utilities.

Under a Phase II test program scheduled to begin in October 1997, the most promising technologies will be field-tested on a larger scale.

Program Goal

Coal represents 94% of proven U.S. fossil fuel reserves, but burning coal to generate energy produces harmful emissions. It is in our national interest to make use of this plentiful domestic energy source with minimal adverse impact on the environment. The ABB project supports the goal of the Advanced Power Systems Program by investigating highly efficient, affordable technologies that further the use of coal as a reliable, low-cost energy source, while meeting or exceeding pending environmental regulations.

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Project Benefits

Reducing the emissions of fine particulates and hazardous air pollutants can help utilities meet tightening air-quality standards. The ABB project explores and demonstrates how utilities can comply with environmental regulations in a cost-effective manner by developing retrofit technologies that enhance rather than replace existing processes.

With direct application to the electrostatic precipitation processes used by nearly 90% of currently operating utilities, the technologies investigated by the ABB project have the potential to reduce fine-particulate emissions, the air toxics associated with these fine particulates, and vapor-phase air-toxics emissions.

Another major benefit of the ABB project is that test results are expected to be directly applicable to plant conditions, since ABB's testing facility can simulate different flue gas conditions typical of coal-based electric utilities.

The enhancements will improve the collection efficiency of older ESPs and plants intending to switch to low-sulfur coals. They also can reduce reintroduction of previously collected particles into the gas stream.

Cost Profile (Dollars in Thousands)

	Prior Investment	FY95	FY96	FY97	Future Funds
Department of Energy *	—	\$285	\$50	\$201	\$1,449
Private Sector Partners	—	\$100	\$360		\$350

* Appropriated Funding

Key Milestones

FY96	FY97
Design & Construction	Testing
Contract awarded 10/95	Design begun 12/95
	Construction begun 2/96
	Construction completed; testing begins 6/96
	Final report 9/97
	Phase II selection 10/97